

# DEWATERING

Code No.  
(1061)

Wisconsin Department of Natural Resources  
Conservation Practice Standard

## I. Definition

A compartmented container, settling basin, filter, or other appropriate best management practice through which sediment-laden water is conveyed to trap and retain the sediment.

## II. Purposes

The purpose of this standard is to determine appropriate methods and means to remove sediment from water generated during dewatering activities prior to discharging off-site or to waters of the state. Practices identified in this standard shall be deemed to meet the de-watering performance standard to prevent the discharge of sediment to the maximum extent practicable (MEP) as defined in NR 151.11(6)(c).

## III. Conditions where Practice Applies

This practice applies where sediment laden water needs to be removed for construction or maintenance activities. Dewatering practices shall be in keeping with the effective operating and applicability criteria listed on Figure 2, Dewatering Practice Selection Matrix.

This practice does not apply to:

- Water being discharged directly to groundwater or *karst features*<sup>1</sup>. Refer to NR140.
- Well dewatering systems. Refer to NR 812.

## IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state, and local laws, rules, regulations, or permit requirements governing the use and placement of this practice. This may include activities performed under NR 216 and Chapter 30 permits, for water bodies with *targeted performance standards* per NR 151.004, 303d waterbodies or others. This standard does not contain the text of federal, state, or local laws.

## V. Criteria

This section establishes the minimum allowable limits for design parameters, installation and performance requirements.

Dewatering practices shall be selected based on the predominant soil texture encountered at the dewatering site with consideration given to pumping or flow rates, volumes and device effectiveness. Refer to Figure 1 USDA Soil textural triangle to assist with soil classifications at the site. Figure 2, Dewatering Practice Selection Matrix illustrates acceptable dewatering options and their effective ranges. Practices selected that are not on the matrix must provide an equivalent level of control, with justification provided to the reviewing authority.

**A. Site Assessment** - A site assessment shall be conducted and documented to determine the physical site characteristics that will affect the placement, design, construction and maintenance of dewatering activities. The site assessment shall identify characteristics such as ground slopes, soil types, soil conditions, bedrock, sinkholes, drainage patterns, runoff constituents, proximity to regulated structures, natural resources, and specific land uses. The site assessment shall include the following:

- Sanitary and storm sewer locations
- Potential contamination - Odor or discoloration other than sediment, or an oily sheen on the surface of the sediment laden water. If contamination is present, notify DNR Spills Reporting
- Soil textural class for areas where dewatering will occur. Soil investigation shall extend below grading and trenching activities
- Depth to the seasonally highest water table.
- Discharge outfall locations
- Distance and conveyance method to receiving waters

<sup>1</sup> Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

## B. General Criteria applicable to all dewatering activities

1. Contact the WDNR when the discharge from a dewatering practice will enter a WDNR listed *Exceptional Resource Water (ERW)*, *Outstanding Resource Water (ORW)*, or a wetland in an area of special natural resource interest as identified in NR 103.
2. Contact the owner or operator of the municipal separate stormwater system if the discharge is to a municipal storm water conveyance system. The allowable discharge rate shall be limited by the capacity of the system or requirements of the system owner.
3. When practical, dewatering effluent shall be collected in a pump truck for transport to a *treatment facility* or discharged directly to a treatment facility.
4. For surface dewatering, utilize a floating suction hose, or other method, to minimize sediment being sucked off the bottom.
5. For discharges that will be directed to locations on-site verify that the anticipated volume of water can be fully contained.
6. The topography and condition of the ground cover between the pump discharge point and potential receiving waters shall be evaluated for potential erosion. Appropriate stabilization measures shall be incorporated to prevent erosion.
7. When discharge to a karst feature or other direct groundwater connection can not be avoided, the dewatering system must be designed and operated to maintain compliance with the groundwater quality standards contained in applicable regulations, including ch. NR 140 Wis. Adm. Code.
8. If the discharge directly or indirectly enters a stream, the discharge flow rate shall not exceed 50 percent of the peak flow rate of the 2-year 24-hour storm event.

## C. Geotextile Bags

1. Geotextile bags shall meet the criteria listed in Table 1.

**Table 1: Properties for Geotextile Bags**

Property	Test Method	Type I Value	Type II Value
Maximum Apparent Opening Sizes	ASTM D-4751	0.212 mm	0.212 mm
Grab Tensile Strength	ASTM D-4632	200 lbs.	300 lbs.
Mullen Burst	ASTM D-3786	350 psi	580 psi
Permeability	ASTM D-4491	0.28 cm/sec	0.2 cm/sec
Fabric	Nominal Representative Weight	8 oz	12 oz

2. Geotextile bags shall be sized according to the particle size being trapped, expected flow or pumping rate (gallons per minute) per square foot of fabric and a 50% clogging factor. The footprint of the bag shall be no smaller than 100 square feet.
3. Geotextile bags shall be securely attached to the discharge pipe.
4. Polymers can be used to enhance the efficiency of geotextile bags. If polymer is used, the polymer shall be approved by the WDNR and meet the criteria stipulated in WDNR Conservation Practice Standard 1051, Sediment Control Water Application of Polymers. The polymer supplier or applicator shall provide certifications showing that products have met the performance requirements of Standard 1051. If the manufacturer has not completed the required testing, the project may be used to gain that certification provided it meets the site requirements of Standard 1051. Any such testing will be monitored by DNR or WisDOT, with testing done by a qualified third party.

## D. Gravity Based Settling Systems

Gravity based systems rely on settling of particles as the primary means of treatment. To effectively accomplish this, quiescent conditions should exist with sufficient detention time. Practices include portable sediment tanks, sediment traps, sediment basins and wet detention basins.

If polymer is used to enhance settling, the polymer shall be approved by the WDNR and meet the criteria stipulated in WDNR Conservation Practice Standard 1051, Sediment Control Water Application of Polymers. The polymer supplier or applicator shall provide certifications showing that products have met the performance requirements of Standard 1051. If the manufacturer has not completed the required testing, the project may be used to gain that certification provided it meets the site requirements of Standard 1051. Any such testing will be monitored by DNR or WisDOT, with testing done by a qualified third party.

1. Portable Sediment Tank: These tanks are intended to settle only sands, loamy sands, and sandy loams. If polymer is added, these tanks will also be appropriate for settling loams, silt loams and silts. Portable sediment tanks shall have a minimum of two baffled compartments, and be a minimum of three feet deep. The inlet and outlet pipe shall be a minimum diameter of three inches. Use one of the following methods to size a tank:

- a. Settling: Account for settling of the suspended sediments with the following equation:

$$S_a = 1.83 * Q;$$

where

$S_a$  = Tank surface area (sq ft)

$Q$  = Pumping rate (gallons per minute)

Note: 1.83 is a factor that includes the conversion from gpm to cfs (1 gpm = 0.0022 cfs) and the particle settling velocity for Soil Class 1 (0.0012 ft/sec) from WDNR Conservation Practice Standard 1064 Sediment Basin.

- b. Filtration: Build the first chamber as large as possible to aid in settling. Flow capacity shall be determined by the end area of the filter media (fabric) and the flow rate (gallons per minute) per square foot of the finest filter media and a 50% clogging factor.
2. Sediment Trap or Sediment Basin: This device is a temporary sediment control device. The design, installation, and operation of the sediment trap or basin shall

meet the requirements stipulated in WDNR Conservation Practice Standard 1063 Sediment Trap or Standard 1064 Sediment Basin

3. Wet Detention Basin: This device is generally a permanent structure designed to address post-construction pollutant reduction requirements. The design, installation, and operation of the wet detention basin shall meet the requirements stipulated in WDNR Conservation Practice Standard 1001 Wet Detention Basin.

#### **E. Passive Filtration Systems**

Passive filtration systems rely on filtration as the primary method of removing particles. Sediment removal efficiency will be related to the particle size distribution in the stormwater. Practices include manufactured filters, filter tanks, filter basins, vegetative filters, grass swales, and filtration fabric.

Filter fabric sediment removal efficiency shall be based on the properties specified in Table 1.

1. Manufactured Filters: Filters shall be sequenced from the largest to the smallest pore opening. Sand media filters are available with automatic backwashing features that can filter to 50  $\mu$ m particle size. Screen or bag filters can filter down to 5  $\mu$ m. Fiber wound filters can remove particles down to 0.5  $\mu$ m.
2. Filter Tank (portable): Install, operate and maintain according to manufacturer recommendations.
3. Filter Basin: Install, operate and maintain according to Wisconsin Department of Transportation technical guidance.
4. Vegetative Filter: Refer to WDNR Conservation Practice Standard 1054 Vegetated Buffer for Construction Sites.

#### **F. Pressurize Filtration Systems**

Pressurized filtration systems differ from passive systems in that the water flowing through the media is pressurized and the filter media is designed to handle higher flow rates. Practices include portable sand filters, wound cartridge units, membranes and micro-filtration units.

Pressurized filters typically have automatic backwash systems that are triggered by a pre-set pressure drop across the filter. If the backwash water volume is small or substantially more turbid than the stormwater stored in the holding pond or tank, returning backwash water to the pond or tank may be appropriate. However, land application or another means of treatment and disposal may be necessary.

Screen, bag, and fiber filters must be cleaned and/or replaced when they become clogged.

1. Portable Sand Filter: Install, operate and maintain according to manufacturer recommendations.
2. Wound Cartridge Units: Secondary filtration of sediments using high efficiency filter cartridges may be necessary to remove fine particles such as clays. Install, operate and maintain according to manufacturer recommendations.
3. Membranes and Micro-filtration: Install, operate and maintain according to manufacturer recommendations.
4. If polymer is used to enhance settling, the polymer shall be approved by the WDNR and meet the criteria stipulated in WDNR Conservation Practice Standard 1051, Sediment Control Water Application of Polymers. The polymer supplier or applicator shall provide certifications showing that products have met the performance requirements of Standard 1051. If the manufacturer has not completed the required testing, the project may be used to gain that certification provided it meets the site requirements of Standard 1051. Any such testing will be monitored by DNR or WisDOT, with testing done by a qualified third party.

## VI. Considerations

- A. It may be necessary to clean the municipal storm drainage system prior to and after discharging to the system to prevent scouring solids from the drainage system.
- B. Geotextile bags are generally not appropriate when discharging to ORW, ERW, waterbodies supporting cold water communities, trout

streams, or to *highly susceptible and less susceptible wetlands*.

- C. Pressurized filtration systems are the most efficient for removing fine sediments.
- D. Portable sediment tanks may be appropriate when other sediment trapping practices cannot be installed due to lack of space or other reasons.
- E. Filtration is not an efficient treatment of water with heavy sediment loads. Use a settling tank or sand filter as pretreatment when possible.
- F. It may be necessary to use a combination of dewatering practices to achieve the intended results.

## VII. Plans and Specifications

All plans, standard detail drawings, or specifications shall include the schedule for installation, inspection, and maintenance and shall be kept on-site with the erosion control plan.

## VIII. Operation and Maintenance

- A. Sediment shall be removed from devices to maintain effectiveness. All sediment collected in dewatering devices shall be properly disposed of to prevent discharge to waters of the state.
- B. The following monitoring shall be conducted. Test results shall be recorded on a daily log kept on site:
  1. Discharge duration and specified pumping rate
  2. Observed water table at time of dewatering.
  3. If used, type and amount of chemical used for pH adjustment
  4. If used, type and amount of polymer used for treatment
  5. Maintenance activities

## IX. References

The American Association of State Highway Officials (AASHTO) Soil Classification System

## X. Definitions

*Exceptional Resource Waters (ERW)* (V.B.1): are waters listed in s. NR 102.11.

*Highly susceptible wetland* (VI.B): include the following types: fens, sedge meadows, bogs, low prairies, conifer swamps, shrub swamps, other forested wetlands, fresh wet meadows, shallow marshes, deep marshes and seasonally flooded basins.

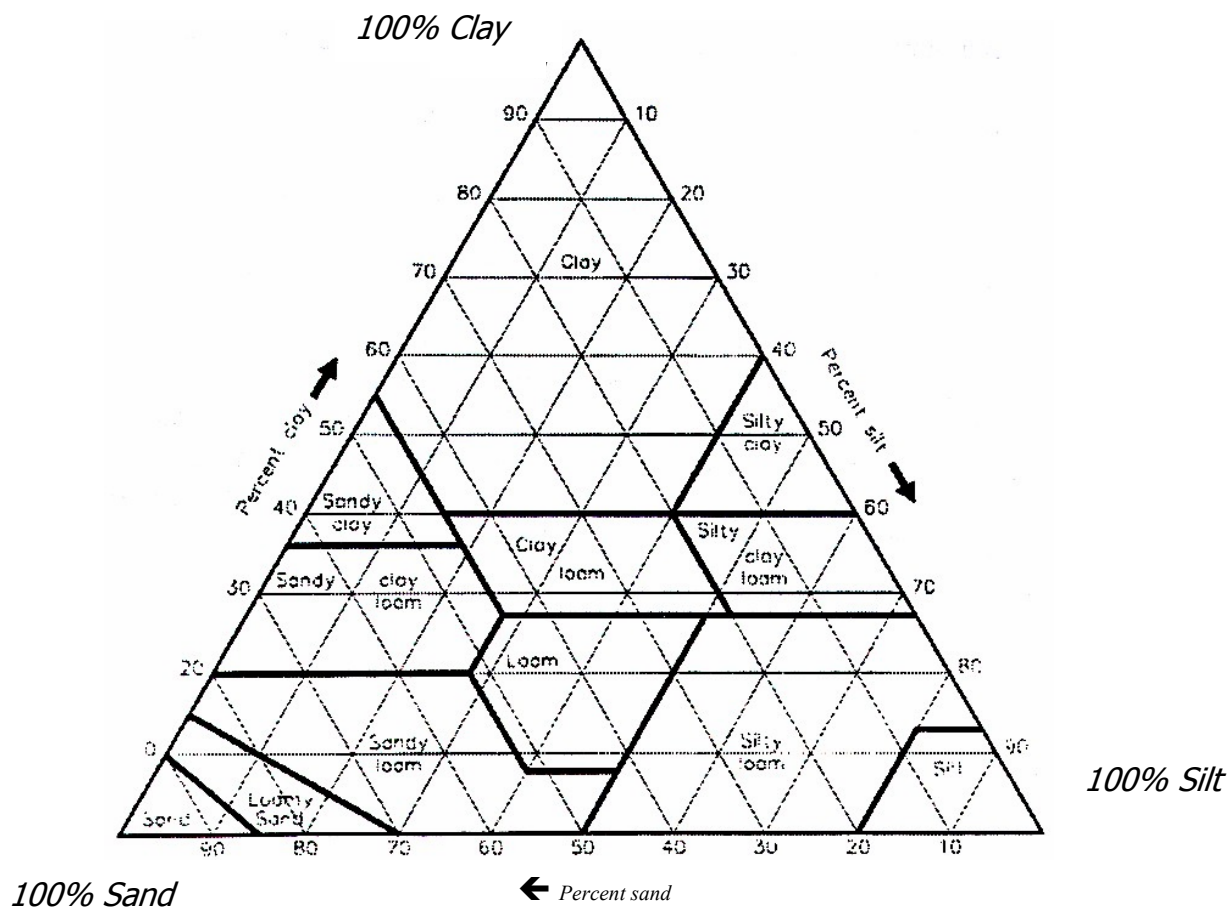
*Karst feature* (III): are an area or geologic feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps or swallets.

*Less susceptible wetland* (VI.B): include degraded wetlands dominated by invasive species such as reed canary grass.

*Outstanding Resource Waters (ORW)* (V.B.1): are waters listed in s. NR 102.10

*Targeted performance standard* (IV): means a performance standard that will apply in a specific area, where additional practices beyond those contained in NR 151 are necessary to meet water quality standards.

*Treatment facility* (V.B.3): includes wastewater treatment plants or wet detention basins constructed in accordance with WDNR Conservation Practice Standard 1001 Wet Detention Basin or other approved land application sites.



**Figure 1: USDA Soil Textural Triangle**

**Figure 2: Dewatering Practice Selection Matrix**

Type of Dewatering Practice	Soil and Texture Classification			Notes
	Coarse Texture	Medium Texture	Fine to Very Fine Texture	
	Sand, Loamy Sands, and Sandy Loams	Loams, Silt Loams, and Silts	Clay Loams, Silty Clays and Clay	
<b>Geotextile Bags</b>				
Type I	—————	● ● ● ● ● ● ● ● ● ●		
Type II	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	—————	● ● ● ● ● ● ● ● ● ●	
<b>Gravity Based Settling</b>				
Sediment Tank	—————	● ● ● ● ● ● ● ● ● ●		
Sediment Trap (Temporary)	—————	● ● ● ● ● ● ● ● ● ●		Use Standards 1063 or 1064
Sediment Basin (Temporary)	—————	—————	● ● ● ● ● ● ● ● ● ●	Use Standard 1064
Wet Detention Basin (Permanent)	—————	—————	—————	Use Standard 1001
<b>Passive Filtration</b>				
Filter Tank	—————	—————	● ● ● ● ● ● ● ● ● ●	
Filter Basin	—————	● ● ● ● ● ● ● ● ● ●		
Vegetative Filter	—————	—————	—————	Effectiveness depends upon the width of the filter and the runoff rate of flow. See Standard 1054 for design guidelines.
<b>Pressurized Filtration</b>				
Portable Sand Filter	—————	● ● ● ● ● ● ● ● ● ●	● ● ● ● ● ● ● ● ● ●	The contractor shall provide a certification sheet from the manufacturer specifying performance of the device based on the soil type and pumping rate.
Wound Cartridge Units	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	—————	—————	
Membranes & Micro-filtration	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	Very effective but high maintenance requirements
<b>Other Practices</b>				
Sanitary Sewer Discharge	—————	—————	—————	
Pump Truck	—————	—————	—————	Transported to treatment facility
Alternate Method				Discuss alternate options with regulatory authority

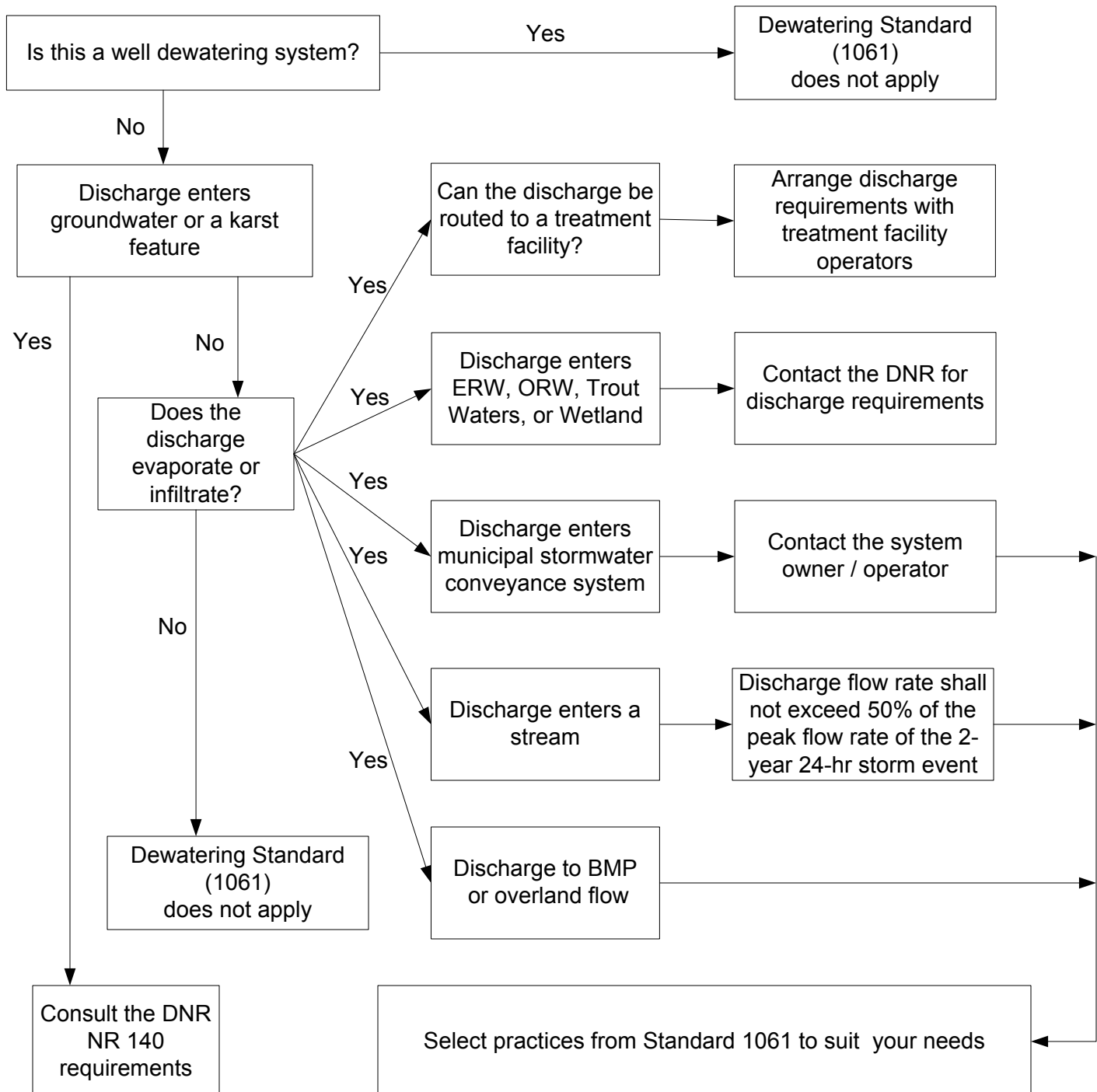
**Key:**

Effective range of device: —————  
 Device applicable but may not be cost effective: ■ ■ ■ ■ ■  
 Effective range with addition of polymer: ● ● ● ● ● ● ● ● ● ●

**Notes:**

- (1) The effectiveness of many practices can be enhanced through the use of polymer mixture.
- (2) Soils classification shall be done in accordance to an accepted method (i.e. USDA, AASHTO)
- (3) Standard 1063 Sediment Trap
- (4) Standard 1064 Sediment Basin
- (5) Standard 1054 Vegetated Buffer for Construction Sites
- (6) Standard 1001 Wet Detention Basin
- (7) Discuss alternate options with the regulatory authority

## Figure 3. Do you know what factors will influence your dewatering practice decision?



If the dewatering effluent is discolored, has an odor, an oily sheen, or other known toxins are present notify the DNR immediately.

**24 Hour Spills Reporting Hotline 1-800-943-0003**